THE Tasmanian Naturalist

MUSEUM OF VICTORIA

THE JOURNAL OF THE

Tasmanian Field Naturalists' Club

Vol. 2. OCTOBER, 1910. No. 3.

CONTENTS:

Annual Report	39-41
Treasurer's Report and Balance Sheet	41-43
Camp Out, 1911	43
Insects of Tasmania	44-51
Notes on Plant Classification	51-53
Cave-Inhabiting Beetles	53-58
Note on an 'Amphioxus' from S.E. Tasmania	58
A New Chiton	59
Book Notice	59
Publications Received	59, 60
Certificates of Membership	60

PRICE: SIXPENCE

Tasmania:
J. WALCH & SONS, PRINTERS, 130 MACQUARIE STREET, HOBART
1910

THE

Tasmanian Naturalist

THE JOURNAL OF THE

Tasmanian Field Naturalists' Club

VOL. II. OCTOBER, 1910. No. 3.

Sixth Annual Report,

September, 1910

THE year under review has been more successful than any former year. The membership is high—35 ordinary and 13 junior members joined during the session, and after removing from the roll 17 names of those who have resigned, or whose subscriptions were too far in arrears, we have at present a total membership of 184 (seniors 139, and juniors 45).

Eleven monthly meetings have been held, and the highest attendance was 142, whilst on no occasion has the number been low. The meetings are becoming more and more interesting, and the satisfaction of the lecturer at the attention he receives is evident; a pleasing feature is that junior members are becoming more ready to exhibit specimens and speak a few words upon them. Following precedent in these Reports short accounts of the meetings are given herewith :—

September 23rd, 1909. Annual Meeting. 153 members. Credit balance of £1 17s. 11d. Address by Chairman (L. Rodway) on 'Carnivorous Plants of Tasmania.'

October 28th. Meeting taken up with discussions on specimens exhibited by Messrs. Robert Hall, R. A. Black, A. J. Taylor, A. D. Mackay, L. Rodway, and Masters H. V. and H. B. Bayley, and B. Watchorn.

November 18th. Lecture on 'The Life of the Tasmanian Flounder,' by T. Thompson Flynn, illustrated by sketches on the blackboard and microscopic slides

December 10th. Mr. Robert Hall spoke on 'The Geographical Distribution of Australian Birds,' illustrating his address with specimens and diagrams.

February 10th, 1910. Dr. E. W. J. Ireland delivered an interesting lecture on 'Milk and Milk Bacteria,' illustrating his remarks with numerous lantern slides and diagrams.

March 10th. Mr. A. M. Lea delivered an instructive address on 'Entomology,' illustrated by numerous lantern slides.

April 14th. Specimens obtained at Easter Camp were shown and explained; most were shown by Mr. Robert Hall. Mr. E. A. Elliott (Hon. Secretary) gave a lecture on the 'Camp,' showing many lantern views of the scenery and camp life.

May 26th. Mr. T. Thompson Flynn gave an interesting lecture on 'Infusorial Life,' clearly explaining the life histories of single celled organisms and also multi-cellular.

June 16th. Mr. J. H. Gould lectured on 'Vegetable Drugs,' showing many specimens, describing where and how they were obtained, &c.

July 14th. Mr. S. Clemes addressed the meeting on 'Modern Methods in Nature Study,' giving members much encouragement in continuing their studies, and showing wider fields for their energies.

August 11th. Lecture by Dr. J. S. Purdy on 'Insects as Carriers of Disease,' showing how disease is spread by insects and the methods used to exterminate the insects, thus wiping out the sicknesses.

Nine excursions were held, and although they were successful as to the material obtained, and also the attendances, yet it is most desirable that greater interest be taken in these field excursions, so that the leaders' abilities may be used to most advantage. More attention than formerly was given to marine life, and it is important that our harbour should be better explored. Further dredging and shore-life trips will be held, but provision for land excursions will not be disregarded during the next year.

Two camps were held—one at the mouth of the Huon River, when a party of 27 was taken in Mr. Golding's steam yacht (and our thanks are due to this member for kindly placing his yacht at our service on this and other occasions). The other camp was held at Freycinet Peninsula during Easter, and was carried out on a more extensive scale than any previous one. The steamer Koonookarra was again chartered, and no less than 97 persons took part in the camp. Although largely an enjoyable social function, yet the scientific results were such not only to justify the camp, but also the very Club itself. The steamer was used most of the time for dredging, and some 200 specimens of molluscs were obtained, including 60 new to Tasmania, and 25 new to science; many specimens were secured among the crustacea and marine fauna generally.

Only one issue of the journal, at the very commencement of the session, has been made, and this number included an excellent article in the form of a handbook or guide to the Mollusca. Another article was prepared by one of the members on the birds of Tasmania, but owing to a handbook being published privately covering all this field, it was decided to deal with instead the insects in the next number. It is hoped that handbooks on all branches of natural history will be published before long in *The Tasmanian Naturalist*, but this can only be carried out by the regular payment of subscriptions by members and the issuing of two or more numbers each year.

The meetings during the year have been held in the rooms of the Royal Society by courtesy of the Council, but notice of the termination of our rental was received, and therefore the first business of the incoming committee will be to determine whether permanent quarters had better be secured, or simply a room for monthly meetings as formerly. Our thanks are due to Mr. Rodway, our Chairman, for allowing the use of his rooms for committee meetings.

The financial position of the Club is a sound one, and the time has now arrived when the working expenses, such as rent and advertising, will increase very slightly; therefore, as members' subscriptions increase, more and more will be available for the cost of printing the journal or other matters of common interest. Certificates of membership are being prepared, and these will only be issued to present members when their subscriptions are fully paid, and to new members as they contribute to the funds Although donations are welcome and are solicited towards the printing fund, yet the regular payment of subscriptions is the important factor to our financial well-being.

Report of the Hon. Treasurer of the Field Naturalists' Club

I beg to submit my Annual Report for the year 1909-10:—The year opened with an apparent credit balance of £1 17s. 11d., but as a matter of fact it was with a debit balance of £11 18s. 3d. In my last Annual Report I pointed out that the cost of printing the Club's Journal was not included in the Statement of 1908-9, for the reason that it was not ready at the time of balancing, hence the apparent credit balance. The cost of the Journal, namely, £13 16s. 2d., is of course included in the present Statement.

The Club might now be said to be in a much sounder position. Its assets greatly exceeding its liabilities. Although this state of affairs may appear satisfactory it is not altogether so, because there is no way of enforcing the payment of outstanding amounts.

At the time of balancing there were amounts of £6 10s. (current subscriptions) and £3 3s. 9d. (subscriptions long in arrears) outstanding. Special pleading Circulars were sent to all those who had not paid, but getting such poor results it was resolved at a Committee meeting, to write off the £3 3s. 9d.

It is important that the financial safety of the Club be secured at once and this to my mind can only be done by enforcing the Rule which governs the election of members; otherwise the Treasurer will not have sufficient funds to meet the cost of an Annual Journal in future. Members must pay subscriptions upon election or else be debarred from receiving any privileges of the Club. A leakage of considerable magnitude takes place under the present system of election. It is regretted that the Treasurer is so harsh but he is required to advise the Club of the true state of its finances. Members who did not pay their subscriptions received notices of all Meetings, postage prepaid, shared in the benefits of the rented room, advertisements, received the Club's Journal free, and were permitted to join excursions. There were on the Roll the names of a very large number of persons who allowed their subscriptions to get in arrears and when they were asked for the amounts some of them sent in their resignations. This untoward state of affairs will be obviated by strictly enforcing the present Rule referred to. There was an object in not enforcing it before, because the Club being in its infant state every encouragement was given persons to become members and join in the highly delightful recreation of Nature study.

The transactions of the Club are an increase over those of the previous year by £11 17s. 8d., and the total amount due by members as subscriptions for the year 1909-10 was £36 12s. 6d., of which £30 2s. 6d. have been paid, being an increase over last year's subscriptions by £3 17s. 6d.

Donations to 'Printing Fund' have not been quite so liberal, but our best thanks are tendered those who have been so generous to contribute.

Through the good work of the Secretary the Funds of the Club have been benefited by £6 8s. 2d., this amount represents a surplus over and above that which was required to meet all liabilities of the Easter Camp-out Meeting.

It will be noticed that the rent paid for the room is in excess of that of last year by £1 12s. 6d., this is on account of the Royal Society's permitting the Club to meet there.

The Statement of Receipts and Expenditure shows a credit balance of £8 6s. 6d., but it must be borne in mind that this is on account of there being no issue of the Club's Journal.

I would add that if all members paid their subscriptions promptly the Club would be in a most prosperous condition, and could not only meet all liabilities, but have a substantial balance to its credit.

Statement of Receipts and Expenditure

For the Year ending 30th September, 1910

RECEIPTS				EXPENDITURE			
Balance brought forward ...	£1	17	11	Cost of Publishing Journal	£13	16	2
Subscriptions paid in advance	1	10	0	Stationery and Stamps ...	4	11	0
Current Subscriptions (year 1909-10)	30	2	6	Rent of Room	6	10	0
Subscriptions—arrears ...	3	7	6	Charter of Ss. Breone ...	6	2	6
Donations Printing Fund ...	1	10	6	Charter of Brake to Springs	2	10	0
Sale of Publications	0	16	0	Advertising	9	1	0
Contributions towards cost of chartering Ss. Breone ...	3	7	6	Miscellaneous	1	5	0
Discount allowed by owners of Ss. Breone	0	7	6	Credit Balance	8	6	6
Surplus from Easter Camp-out	6	8	2				
Surplus from November Camp-out	0	12	6				
Contributions towards cost of chartering brake to Springs	2	0	0				
Bank Interest	0	2	1				
	£52	2	2		£52	2	2

Audited and found correct,

R. A. BLACK,
Hon. Treasurer.

T. C. SIMPSON,
Auditor.

22/9/10

Camp-Out.

PORT Davey has been decided upon as the Camp-site for Easter, 1911. It is anticipated that this camp will be more successful than any previous one, and the scientific results should be very important. The cost to members is estimated at £2 per head; Fortescue Bay has been chosen as an alternative site in the event of S.W weather prevailing at the time of departure.

The Insects of Tasmania.

Part I.

By ARTHUR M. LEA, F.E.S.,
Government Entomologist.

WE have in Tasmania many insects; how many is not yet known, and probably will not be known for many years, if ever. But it is probable that we have between 15,000 and 20,000 distinct sorts. Some of these are extremely minute, and others are so local in their distribution that they are seen by but few people. To some people everything that crawls or wriggles is an insect, but a typical insect in its adult stage is divided into three main parts, the head, the thorax, and the abdomen, and these are usually well defined. The head contains the jaws or mouth parts, two compound and sometimes three simple eyes. Attached to it on the top or sides are two appendages known as antennæ, of very variable shapes—often fan-like, clubbed, or linear, and sometimes of greater length than the body. Attached to the mouth are two, four, or six small processes, known as palpi, or lip feelers. To the thorax are attached four or two wings, and six legs. There are, however, many exceptions, as with the ants, of which some forms are wingless, some of the scale insects, which are without legs, and with the body not in three distinct parts, &c. Insects also breathe through their sides through small openings known as spiracles, and there are certain other distinguishing features. The earlier stages are frequently very different in appearance to the adults, so that the connection between them has to be worked out by rearing Some of the earlier stages, as with most caterpillars of moths and butterflies, appear to possess more than six legs, although the additional supposed legs are really claspers, and are attached to the abdominal segments.

Creatures such as spiders with the body in two main parts only, and with eight legs; ticks and scorpions with the body in one main piece, and also with eight legs; centipedes and millipedes, with the body in numerous segments and with dozens or hundreds of legs, are not insects, although they creep about much like many insects do.

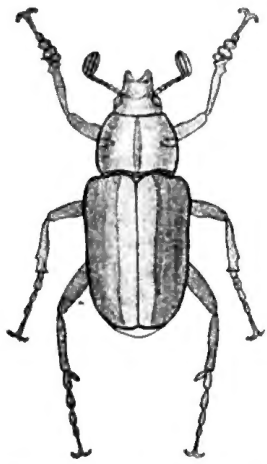
In this part it is only intended to give a rough idea of the general classification, with a few figures to enable our junior members to recognise the particular division to which an insect he captures belongs; as there are so many insects known from Tasmania, that it would be impossible within the small space here available to deal with them all. Later it is hoped to deal with the various orders separately.

Insects are grouped in divisions known as ORDERS; according to their structure as adults, and the changes they undergo before becoming adult. Some of the orders contain thousands of species, and others comparatively few; whilst some very small groups have been regarded

as forming small orders by themselves, or have been treated as aberrant groups of some of the larger ones. But in general the orders are well defined, and in consequence easy of identification. They are as follows : —

Coleoptera, or Beetles.

With beetles the front wings are modified into horny sheaths known as elytra, which meet straight down the middle, and usually conceal the abdomen and a pair of wings that are used for flight (the wings, however, are often absent). They are also possessed of jaws, and undergo striking changes before attaining the mature form.



THE GREEN BEETLE
(Diphucephala Colaspidoides)

There is first of all an egg, from this hatches out a six-legged larva, who, when full fed, turns into a pupa, a stage in which the wings and elytra are first seen, although not in their final forms. In the pupal stage no food is consumed, and in due course the pupa turns into a beetle. The period during which these changes take place varies from a few weeks to several years, according to the species

There are more beetles than insects of any other order, and although the majority are not so strikingly beautiful as many butterflies and moths, they are so easily preserved that they have long attracted many collectors.

Most beetles feed on vegetable matter, either living or dead, but many feed on other insects. As larvæ they consume a considerable amount of food, but as a rule seldom approaching the quantities consumed by the larvæ of moths and butterflies. When adult many cease to take food of any description.

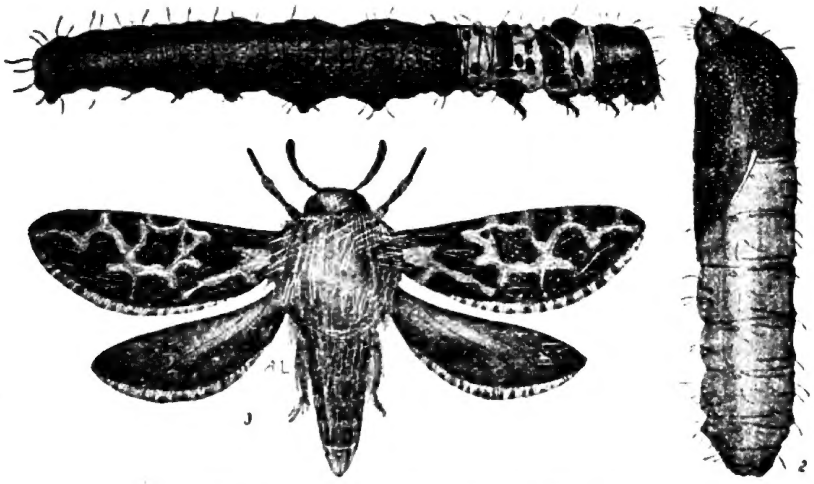
The beetles are divided into numerous families, many being without representatives in Tasmania.

Lepidoptera, or Butterflies and Moths.

In this order the mature insects possess four wings ; and, except in very few species, the wings are completely covered with scales, becoming fine hair or down in places. The scales are frequently of brilliantly metallic colours, and are arranged in patterns, so that they have long been favourites with collectors. Owing to their extreme fragility, however, they are very easily injured, and great care is needed to preserve their scales in perfect condition. In a few groups the wings are almost or quite absent from the females.

The species have four stages, as with the beetles, and as with those insects the pupal stage is an inactive one. But while the beetles feed by means of jaws, both in the larval and adult stages, the larvæ of this order are provided with jaws, whilst as adults they have a double sucking

tongue or probocis, which, when at rest, is coiled up beneath the head, and can often be extended for a considerable length.



THE UNDERGROUND GRASS GRUB.
(1) The Grub; (2) the Chrysalis; (3) the Moth.

The larvæ feed on vegetable matter, mostly living, but a few feed on various dried products, and a few others on scale insects. Some of the species are so voracious that they consume many times their own weight of food in a day, and as they occur in enormous numbers, they are sometimes very serious pests. In Tasmania the Underground Grass Grub *(Oncoptera intricata)* and the Barley Grub *(Mamestra Ewingi)* in some years destroy the entire grass or grain crops over hundreds of acres. Whilst the codlin moth (an introduced species) destroys thousands of pounds worth of apples and pears. As adults, moths and butterflies usually live on the nectar of flowers; but many species, and especially the males, take no food of any kind.

Lepidoptera are divided into two main groups—the *Rhopalocera*, or butterflies, and the *Heterocera*, or moths. The former have the antennæ clubbed, and usually spin no cocoon; while the latter have the antennæ more or less comb-like, and usually spin a cocoon, or in default, construct a special chamber, either within the limbs of trees, or in the ground. In Tasmania the beginner should have no trouble in distinguishing a butterfly from a moth, although, in some parts of the world, there are some species the positions of which have been much questioned.

Orthoptera, or Grasshoppers, Crickets, &c.

In their adult stages the insects of this order, except when they possess none at all, have four wings, of which the hind pair alone are usually used for flight, the front pair being shorter and stouter, and usually being used for the protection of the hind pair, or as balancers during flight. They are provided with jaws or mandibles.

Their metamorphoses or changes are incomplete, in that the larvæ and pupæ resemble the adults to a great extent, and are active throughout.

The eggs are usually deposited in mass, and not singly as with most insects.

GRASSHOPPER
(Chortoicetes terminifera).

The order is divided into several main groups, such as the grasshoppers and crickets, walking stick insects, praying insects and earwigs. The white ants are also sometimes referred to the order. With the exception of the praying insects, they are nearly all plant feeders.

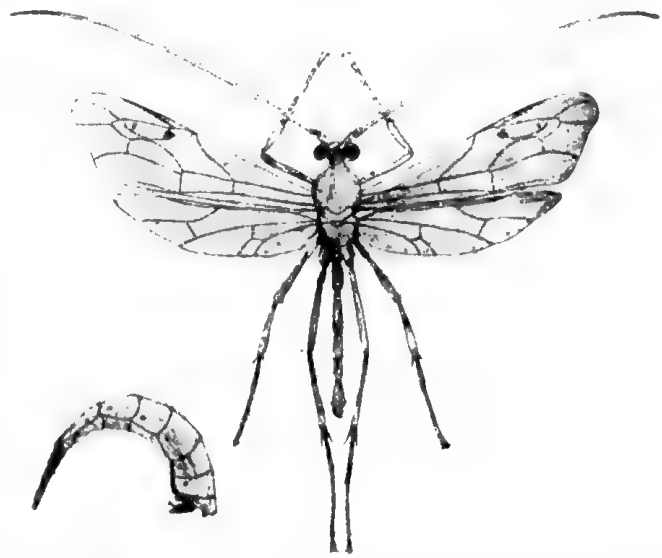
To the order belong some of the worst pests known, and many records of famines caused by visitations of grasshoppers or locusts are noted in the Bible, and other ancient records. In Tasmania we have seldom been seriously troubled by such pests, although on the mainland, in some years, thousands of head of stock have been lost by famines caused by grasshoppers.

The largest known insects belong to the order, some of the walking-stick insects measuring over a foot in length when the legs are stretched out. And in Tasmania, the longest (although not the bulkiest) insect belongs to this order. Their colours are frequently green, but these usually change to a dingy yellow or brown shortly after death, and especially if the specimens have been preserved in spirits.

Hymenoptera, or Wasps, Ants, Bees, &c.

To this order belong the ants, bees, hornets, sawflies, ichneumon flies, &c. Some of them, as the bees, are directly useful to man; and others are indirectly useful by checking the undue multiplication of destructive insects. Comparatively few are destructive.

The species differ widely in their various stages, the larva being frequently a legless, maggot-like object, changing to an inactive pupal form, in which, as with the beetles, the wings are traceable; and finally to the winged form; although in some groups the males are winged and females not (in one group, not represented in Tasmania, the females are winged, but not the males). They are provided with jaws, although, as with the bees, there is also a tongue which is used for obtaining food of a liquid nature.



ICHNEUMON FLY *(Paniscus)* and side view of abdomen.

When present the wings are four in number, and are membranous, the finer parts being strengthened by comparatively strong veins or nerves. On each side there are small processes that enable the wings to interlock, so that the two wings on each side beat as one.

Probably no order of insects has excited greater interest than the Hymenoptera, owing to the social habits of many of the bees, ants, and wasps. And it is well known that in their nests ants frequently harbour other insects, which are useful to them, such as aphides and mealy bugs, who give off sweet secretions that are palatable to the ants.

Diptera, or True Flies.

This order is readily distinguished from the others by its members possessing only two wings when adult; these in structure somewhat resemble those of the *Hymenoptera*. The missing pair is represented, however, by two small processes known as halteres, that project from the side of the body behind the wings. When adult they are provided with a sucking apparatus or tongue, but some species have a whole armoury of lancets, spears, etc.

The metamorphoses or changes are complete, the larva usually being in the form of a legless maggot; and the pupa as an elliptic object, protected on the outside by the hardened skin of the maggot.

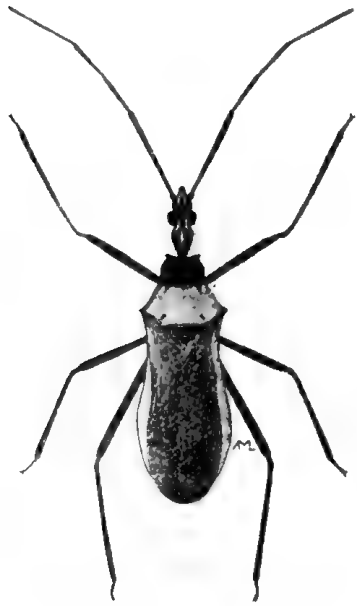
A Parasitic Fly (*Masicera*).

A large proportion of the species live in decaying vegetables or animal matter during their larval stages, which are frequently of short duration. Many others are parasitic within the bodies of other insects, and sometimes of frogs, birds, and even of domestic animals. Some live within the tissues of living plants, and a few are openly predacious.

During comparatively recent times it has been proved that some tropical diseases, such as malaria and yellow fever, are almost or entirely caused by the attacks of flies, especially mosquitoes; and great parts of Africa are caused heavy losses by the tsetse flies, which attack men, horses, and other animals, who are killed by microbes injected into their systems by the bites of flies. It is now known also that the common house fly has been the cause of much of the typhoid, consumption, diphtheria, and other diseases that kill thousands of people every year. Bubonic plague has been often directly traced to the bites of fleas (an aberrant group of flies), and lately fleas have even been blamed for the spread of leprosy.

Hemiptera, or Bugs.

The *Hemiptera* are usually considered as being properly divided into two orders or sub-orders; the *Hemiptera-Heteroptera* or true bugs, and the *Hemiptera-Homoptera*, or scale insects, aphides, cicadidæ, &c.



PIRATE BUG *(Gminetus).*

All the species live by suction, being provided with a thin beak or rostrum, which when at rest is carried pressed against the under surface of the body. The larval, pupal and adult forms, are all much alike, except that in the adult form there are usually four wings (in some groups only two). A few, however, are without wings in the adult form, or sometimes the male is winged, whilst the female is wingless.

Of the true bugs (*Heteroptera*) most species feed on plant juices, but others are carnivorous; and although usually not fitted for seizing and holding other insects by muscular strength, are provided with a poisonous secretion that enables them to paralyse their prey as soon as pierced by their beaks. In this way even small fishes are captured by some of the aquatic species. To the true bugs belong the only insects known that live on the open ocean. Most of the species when audlt have two flight wings, and two shorter covering ones, that when at rest are crossed at their tips.

Of the *Homoptera* almost all species are plant feeders, and to the sub-order belong some of the worst plant pests known, such as the scale insects and aphides, although most of our worst species have

CICADA *(Melampsalta torrida)*

been introduced. The life histories of some of them are highly remarkable, and will probably be dealt with at considerable length later on. Their front and hind wings are usually much alike, and when at rest the front pair do not cross at the tips.

Neuroptera, or Dragonflies, &c.

The Neuroptera comprise many diverse forms of insects that are all sometimes treated as belonging to one order, sometimes to several, and occasionally some of their groups (as for instance the white ants and *Embiidæ*) have been regarded as belonging to the Orthoptera. The best known and typical members of the order are the horse-stingers or dragon flies.

The metamorphoses or changes of most of the groups are complete, that is to say, the larval and pupal forms are totally different to the adult ones. Many of the species pass all their earlier stages in water, only leaving this when about to become winged; and some of their

DRAGON FLY *(Austroæschna multipunctata.)*

larvæ are highly carnivorous, and provided with remarkable processes for seizing and holding their prey. They are all provided with jaws, although in many cases these are hollow, so that they can act as sucking tubes.

In the adult stage they are usually provided with four wings, supplied with numerous cross veins. The wings are sometimes of large size and beautifully coloured, although usually without scales.

One single character alone is not sufficient to mark off the orders of insects from each other, as may be seen as follows:—

Insects with jaws or mandibles—*Coleoptera, Neuroptera, Orthoptera. Hymenoptera*

Insects that live by suction—*Lepidoptera* (in their larval stages they have jaws), *Diptera, Hemiptera.*

Metamorphoses complete (larvæ and pupæ very different to adults) —*Coleoptera, Neuroptera, Hymenoptera, Lepidoptera, Diptera.*

Metamorphoses incomplete (larvæ and pupæ resembling adults to a great degree)—*Orthoptera, Hemiptera.*

Adults with four wings — *Coleoptera, Neuroptera, Orthoptera, Hymenoptera, Lepidoptera, Hemiptera* (the *Coccidæ* with two wings only).

Adults with two wings—*Diptera*

But there are many exceptions and apparent exceptions to these groupings. For instance, many adult insects are without wings, or winged in one sex, and not in the others. With many beetles the flight wings are entirely absent. In the large family of weevils (of the beetles) there is often a long rostrum that appears as a sucking beak, until its tip is examined, when two very minute jaws can be seen. With some flies the mouth is provided with cutting lances. And there are probably some groups that will always be regarded as of doubtful positions.

In addition there are *Thysanura*, which are supposed to be the lowest forms of insect life, and *Stylopidæ*, curious parasites of bees and hopping bugs, that have been referred at various times to the *Hemiptera* and *Coleoptera*, or to a distinct order—*Strepsiptera.*

Notes on Plant Classification.

By L. RODWAY (Government Botanist).

I. GENERAL.

A FIELD NATURALIST, even if he does not wish to take up the study of botany, should know something of the bolder grouping of the plants he meets with, and he will find them of all the greater interest if he learns some of the general facts that have been ascertained.

It is not necessary to define a plant, but it is as well to recognise that however distinct plants seem from animals, yet it is only so in the more specialised types. The two kingdoms, of animals and plants, are continuous, and there are many places where it is only a matter of opinion whether a certain being should be placed in the one or the other group. There are many which are claimed alike by botanists and zoologists. The whole mass of living things constitute one organic kingdom with the one base of organic substance. Their functions are similar. Growth, assimilation, respiration, and reproduction are the same in both groups, only differing in detail, never in principle. Certainly plants alone develop that marvellous substance, plant-green or chlorophyll, which builds up the basis of all organic substance, sugar, from carbonic acid and water. And it is upon this product of green tissue that the whole of both plants and animals are dependant for their food. Yet a very great number of plants, far greater than the casual observer would

suppose, do not possess chlorophyll, and therefore are dependant for their living, just like animals, upon their more gifted relatives. But we are not pursuing the physiological side of the subject. Our aim is to learn something of classification. It is not sufficient that we know a plant by sight and give it a name; we want to know something of the relationship between plant and plant, and we wish to group them together in such a way that each lot shall consist only of beings truly related to one another, and not merely apparently so.

In these papers we are only going to enquire into the grouping of plants into large, clear, well-defined primary groups, or, as they are called, divisions.

All the principal divisions of the vegetable sub-kingdom are everywhere about us, in the town as well as the bush. They are :—

Flowering Plants	Ferns	Mosses
Conifers	Algæ	Fungi, including Lichens.

These the casual observer will have little difficulty in recognising. To them may be added three divisions, which, though not rare, will not be as readily observed, namely :—

Club-mosses Mycetozoa Protophyta

The first division includes all plants bearing flowers, whether those organs be small and obscure, as in Grasses or Sheoke, or showy, as in Rose or Lily.

Conifers include Pines and their allies, whose organs of reproduction may be grouped in masses or cones, but never develop the true details usually associated with the name flower.

Ferns have large leaves, no flowers, and produce on the back or margin of their leaves numerous minute crown spore cases.

Club-mosses appear as if half-way between ferns and conifers. They are rather small, usually a few inches long; the leaves are small and moss-like, and the spore sacks are single in the leaf axils, and generally the spore-bearing part is marked off from the rest like a modified cone.

Mosses are chiefly noticeable in being small and readily drying up. In typical cases the so-called fruit indicates the group. A slender stalk arises into the air, and bears on the summit a small capsule which, on maturity, is full of spores.

Algæ includes seaweeds as well as filamentous and scum-like green growths in fresh water, besides green, brown, or red growths on wet or damp places.

Protophyta includes many primitive forms, extending from Algæ to the lowest forms of life. It contains many green, blue, and nearly black, growths, some of which are common in gutters, as well as are bacteria.

Fungi constitute a large and peculiar group that appears to branch off from the Algæ. They none of them develop chlorophyll, but may be of vivid colour, though never of a pure green. Lichens, which are so common on the ground, on rocks, and on the trunks of trees, are composed of fungi living in parasitic combinations with Algæ or Protophyta.

Mycetozoa is a peculiar group of small plants which, in the vegetation stage, appear as colorless masses of jelly of no definite shape, which travel about and behave very much as an animal would; but when they wish to produce spores they assume a plant condition very similar in appearance to a fungus; commonly a little stalk, under an inch high, with a knob full of spores at the top. Mycetozoa may be considered plants or animals, as you wish.

Ferns may be considered in the middle of the sub-kingdom, and there is much to be gained by studying them first. They will therefore be made the subject of the next article.

On some Tasmanian Cave-Inhabiting Beetles.

By ARTHUR M. LEA, F.E.S.

IN other parts of the world, and notably in Europe, numerous cave inhabiting, and frequently blind, beetles are known. But hitherto no such species have been recorded from Australia I am unaware as to whether other entomologists than myself have systematically searched for such beetles in Australia; but I have searched for them on every available opportunity, and in caves in Western Australia (Busselton district), New South Wales (Jenolan), and Tasmania (one of the Mole Creek Caves and Gunn's Plains Caves near Ulverstone). Early in last December, however, I had the pleasure, in company with Mr. John O. Dawson of the Ida Bay Coal Mining Company, of taking two undoubted species of cave beetles in the Ida Bay Caves. These both belong to the *Carabidæ*; a third species, belonging to the *Dascillidæ*, was taken, but is almost certainly not a true cave inhabitant, although it was taken in such numbers as to preclude the idea of its being there by accident. Mr. Dawson also obtained remains of a species apparently allied to the one here described as *Idacarabus flavipes*, but unfortunately with all its appendages missing. He has, however, promised to keep a look out for cave insects whenever he visits the caves, so that specimens of this species may be forthcoming later on.

Last December also Mr. R. A. Black visited Scott's Caves (one of the Mole Creek Caves), and obtained in them seven specimens belonging to one of the *Cryptophagidæ*.

There can thus be described two species of true cave beetles, and two others which resort to caves in numbers; whilst a fifth is known, but from a very imperfect specimen. In the Jenolan Caves, in bats' droppings, numerous elytra of a common introduced beetle *(Ptinus fur)* were obtained, but these had probably passed through the bats, as no whole specimens, either living or dead, were obtained.

Our true cave beetles are not blind, but as one species certainly, and the other probably, feed on 'glow-worms,' eyes are of use to them.

Of other Australian cave-insects Mr. Froggatt has recorded a cricket from New South Wales, another species is common in several of the Mole Creek Caves, whilst a third occurs in the Ida Bay Caves. All of these have very long antennæ and legs.

In the majority of Tasmanian caves 'glow-worms,' the larvæ of a very peculiar fly, are abundant, and may sometimes be seen in thousands. But similar 'glow-worms' are (so I am informed) sometimes to be seen in deserted mining shafts. And a very similar, if not identical species, is sometimes to be seen under logs in wet gullies.

In all the caves, other insects are to be obtained in the twilight portions, but these appear to be purely chance visitors; as for instance mosquitoes, daddy-long-leg flies, moths, ants, caddis-flies, &c.

Spiders are fairly numerous in Australian caves. Two species at least occur in the Jenolan caves, in the totally dark parts, but one of these I have taken under logs in very wet places, as well as in the caves themselves. Their food is unknown, and it would be interesting to find what it consists of. An enigma, which it is to be hoped Mr. J. C. Wiburd, the well known guide of those caves, will be able to solve. With two species of spiders, both fairly common in parts of the caves, one must suppose that they have insects to feed upon, and yet Mr. Wiburd (from whom I have received thousands of other insects, including many minute species) informs me that in the black parts of the caves he has never found insects, and such was my own experience there. Two species at least occur in the Mole Creek caves, although usually in the twilight parts, one, at least of these commonly feeds on the crickets. At the Ida Bay caves there is one true species of cave spider which feeds on the 'glow-worms,' and two other species are found in the twilight parts. At the Gunn's Plains caves another species is found in abundance in the twilight parts.

CARABIDÆ.

Idacarabus, n.g.

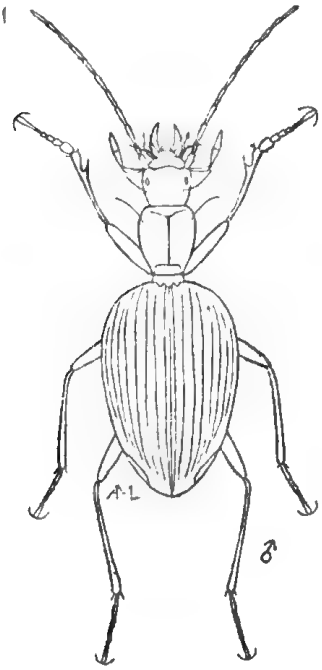
Head rather narrow; clypeal sutures distinct, labrum more than half the length of clypeus and not much narrower. Eyes small, elliptic, sublateral, finely faceted. Mandibles fairly long, strong, curved at apex, simple except for obscure denticulations at extreme base. Antennæ long and thin. Mentum wide. Labial palpi apparently four-jointed, first and second joints short, third long and somewhat curved, fourth as long as third, inflated at base and narrowed at apex. Maxillary palpi long, apparently four-jointed, first joint almost concealed, second long and slightly curved, third and fourth somewhat inflated to their junction, which is somewhat obscurely marked, their combined length about once and one half that of second. *Prothorax* rather narrow. *Scutellum* minute. *Elytra* ovate. *Prosternum* rather strongly ridged, intercoxal process strongly carinated and almost perpendicular behind coxæ. Mesosternum narrow. Metasternum short, in middle obtusely rounded

in front and subtriangular behind. *Abdomen* large, first segment not continuous across middle, second along middle slightly shorter than third, third slightly longer than fourth, and fourth than fifth, sixth about as long as third. *Legs* long and thin; coxæ large; hind trochanters large; femora edentate; front tibiæ strongly notched near apex, the outer edge of the notch with a strong spine, all with two small spines at apex; tarsi thin, front pair of male with basal joint inflated and subspongiose on lower surface, second joint slightly inflated, claws long and thin. Body apterous.

The generic description is drawn up from *troglodytes*; in *flavipes* some of the features are not quite the same, but they are not sufficiently divergent to treat the two species as generically different. The genus, with some slight doubt, is referred to the *Trigonotomides*, and to the vicinity of *Dystrichothorax*.

Idacarabus Troglodytes, n. sp.

Reddish castaneous. Head with two long setæ between eyes and base, clypeal suture with two, and tip of labrum with four smaller ones; prothorax with a long one on each side at apical third; under surface with a few short setæ; antennæ with thin setæ, and setose pubescence; legs setose, the setæ sparse and longer on femora than on tibiæ.



IDACARABUS TROGLODYTES, N. SP.

Head distinctly longer than wide, with a wide shallow impression on each side between eyes. Antennæ extending to hind coxæ, first joint longer than second and shorter than third, third longest of all, the others feebly decreasing in length but eleventh distinctly longer than tenth. *Prothorax* about one-fourth longer than wide, truncate-cordate, sides finely margined but margins more strongly elevated at base; median line finely impressed and near apex traversed by a feeble slightly oblique impression; in places very indistinctly wrinkled. *Elytra* regularly ovate, extreme base no wider than base of prothorax, sides finely margined; near apex with a carina on each side joined on to margin; punctate-striate, striæ rather finely impressed, the punctures very obscure. *Abdomen* with a few punctures. Length, $6\frac{1}{2}$—$7\frac{1}{2}$ m. m.

Hab.—Tasmania: Ida Bay Caves (John O. Dawson and A. M. Lea).

The male differs from the female in being smaller, with slightly longer antennæ and legs, and inflated front tarsi. In suitable lights the whole of the head, elytra, and abdomen appear to be very finely shagreened.

There are seven specimens before me, all of which were taken in the vicinity of 'glow-worms' (the larvæ of a true cave-fly). When lights were thrown on them, they remained quite motionless. They were all taken at a considerable distance from the entrance, and where, except for chance visitors, the only lights they see are those belonging to the 'glow-worms.'

Idacarabus Flavipes, n. sp.

Blackish brown, elytral margins and base of antennæ paler, palpi and legs flavous, tibiæ and tarsi (except claw joint) darker Head with a long seta close to each eye, and one on each side half-way between eye and base, two on clypeus, and several shorter ones on apex of labrum; prothorax with two on each side, a long one at apical third, and a shorter one at base; under surface with sparse and rather long setæ.

Head with two deep and strong impressions between eyes, posteriorly obscurely joined to constriction of neck, hind suture of clypeus feeble. Eyes fairly large and strongly convex. Antennæ somewhat shorter and stouter, but joints proportioned as in *troglodytes*. *Prothorax* about as long as wide, truncate-cordate, near apex considerably wider than at base; with a narrow but distinct median line, continuous to base, but not to apex, near apex traversed by a feeble and slightly curved impression: in places very obscurely wrinkled; margins narrowly raised. *Elytra* elliptic ovate; with distinct striæ, more strongly impressed towards suture than elsewhere, in places with traces of punctures; third on each with three conspicuous setiferous punctures, one at basal fourth, one near middle, and the other at apical two-fifths; margins rather narrow and about each shoulder supplied with four distinct granules. *Legs* fairly long, fourth tarsal joint with a long thin fascicle at apex. Length, $4\frac{1}{2}$ m. m.

Hab.—Tasmania: Ida Bay Caves (John O. Dawson).

I have referred this species to the same germs as *troglodytes* as it agrees in many curious features with that species, but having a single specimen only was not able to examine the parts of the mouth as well as in that species; the palpi are rather shorter and stouter, mentum more depressed, abdomen different, antennæ somewhat shorter and stouter, eyes larger, more convex and with coarser facets, and legs shorter, but with longer claws. The abdomen across the middle appears to be composed of four segments only and at the sides of six. This is due to the suture between the second and third being obliterated across the middle; on each side the suture is fairly distinct, but in addition there is a strongly impressed line from the coxa to the side marking the true basal segment.

The type was pointed out to me by Mr. Dawson some yards away from a cluster of 'glow-worms,' and in the same part of the caves where *troglodytes* was taken. It appears to be a female, as the front tarsi are not inflated.

CRYPTOPHAGIDÆ.

Cryptophagus Troglodytes, n. sp.

Pale reddish castaneous, legs somewhat paler than elsewhere. Clothed with fine, pale, depressed pubescence.

Head with fairly dense and distinct punctures. Antennæ rather long and thin, extending to hind margin of middle coxæ, first joint about once and one-half the length of second, second slightly longer than third, third to eighth of even length, ninth to eleventh forming a loose club, eleventh briefly ovate. *Prothorax* about once and one-third as wide as long, sides almost parallel, angles feebly rounded, apex very slightly wider than base; punctures much as on head. *Scutellum* about twice as wide as long. *Elytra* slightly wider than prothorax, about twice as long as wide, sides almost parallel, apex strongly rounded; punctures somewhat sparser than on prothorax, and becoming smaller posteriorly. *Under* surface with punctures much as on upper surface. Abdomen with basal segment about as long as three following combined, second distinctly longer than third or fourth, and about as long as fifth. *Legs* moderately long and thin. Length, $1\frac{1}{2}$–$1\frac{4}{5}$ m. m.

Hab.—Tasmania: Scott's Caves (R. A. Black).

In general appearance close to *Tasmanicus*, but smaller, prothorax more uniformly and strongly convex, elytra not quite so parallel-sided and with smaller punctures, antennæ longer and thinner, &c. Seven specimens were given to me by Mr. Black as having been taken a long way from the entrance to the caves.

DASCILLIDÆ.

Cyphon Doctus, n. sp.

Of a rather dingy flavous; head black, prothorax (the margins pale) blackish brown, elytra bifasciate, sterna dark brown, abdomen paler, antennæ brownish but basal joints paler.

Head strongly transverse, with dense more or less concealed punctures. Antennæ rather long and thin, first joint rather stout, almost as long as second and third combined, second slightly stouter but no longer than third, third slightly shorter than fourth, fourth to tenth of almost even length, eleventh longer. *Prothorax* about three times as long as length down middle, which is about once and one-half the length of the sides, these wider at base than apex; punctures as on head and elytra. *Scutellum* small, triangular. *Elytra* about twice as long as the width at base, shoulders rounded, sides feebly dilated to beyond the middle. *Under surface* with rather smaller punctures than on upper. *Legs* fairly long. Length, $2\frac{1}{4}$–$2\frac{1}{2}$ m. m.

Hab.—Tasmania: Ida Bay Caves (John O. Dawson and A. M. Lea).

In general appearance somewhat as in *pictus*, but with longer and thinner antennæ, second fascia different, and denser and finer punctures on elytra.

The elytral fasciæ on the type and most of the other specimens are dark brown, the first is at about the basal third, and slightly curved on each elytron, with the hinder margin convex; the second at about the apical third, and from the suture is directed forward so as to be V-shaped, from the apices of the V it is then directed to the sides, with a slight backward trend; from some directions it appears in consequence as a rather feeble M. But on some specimens the first is connected with the second along middle of disc on each elytron, whilst on a single specimen it is almost absent.

Only one living specimen was taken in the caves, and that at a considerable distance from the entrance and near a cluster of 'glow-worms'; but numerous dead ones were seen close to the entrance. These specimens unfortunately were put in a very small tube of spirits, and in the jolting that occurred before they were mounted, lost all their legs and antennæ, and the pubescence was nearly all abraded, leaving the punctures clearly exposed. On the specimen taken living, the punctures are much less conspicuous on account of being partially concealed by the pubescence, but even on the abraded specimens they appear considerably smaller than in *pictus*.

Note on an 'Amphioxus' from South-Eastern Tasmania.

By T. THOMSON FLYNN, B.Sc.

A SOLITARY specimen of 'Amphioxus' was dredged in the recent trip of the Field Naturalists' Club to the East Coast of Tasmania. It was found in clean sand, dredged in 15 fathoms, on the inner side of Schouten's Island. The specimen, considerably damaged, has been handed to me for possible identification, and if necessary, description, by no means an easy task in view of the mutilation of the specimen, and the fact that it must not be sectioned. Nevertheless, I am able with tolerable certainty to recognise it as Asymmetron bassanum which is found in from 15 to 20 fathoms of water round the coast of Victoria. There has been a little uncertainty as to the place of this little animal in classification, definitely set at rest lately by Misses Morris and Raff, of Melbourne At one time it was named Branchiostoma bassanum; later, by Miss Kirkaldy it was re-named Heteropleuron bassanum; still more recently, it was placed in the genus where it still remains as Asymmetron bassanum, although its exact position in that genus was not defined till last year. This is, I believe, the first record of the genus from Southern Tasmanian waters.

A New Chiton.

By W. L. MAY.

WHILST at the Club's outing at Bellerive on the 12th February, 1910, Miss Shoobridge showed me a Chiton just taken from beneath a stone (I afterwards found three more), it had an unfamiliar appearance but I provisionally placed it as a variety of our well known *C. novæ-pollandiæ* until it could be more carefully studied. However, it has now proved to be an interesting addition to our list, viz., *Chiton quoyi, Desh*, a well known New Zealand species. It is true that Tenison-Woods in his Census, 1878, catalogues it, but without comment or habitat, and for want of any confirmation it has been dropped by later workers We can now happily replace it in the list on an enduring basis. It is remarkable that such a conspicuous species (the largest specimen being 1½ inches in length) should have so long escaped detection, it is probably very local, and perhaps confined to the immediate vicinity of Bellerive Bluff. Such a discovery should be an incentive to our young naturalists to leave 'no stone unturned' during future excursions.

Book Notice.

'SOME Wild Flowers of Tasmania' is the title of an excellent little book of 120 pages, by L. Rodway, Government Botanist, in which the flowering plants of Tasmania are brought before young botanists in a chatty and thorough manner. Numerous illustrations from photographs by Miss Olive Barnard make the book most helpful, and the book should be known by heart from cover to cover by all interested in nature study.

Publications Received.

THE following are the names of Journals received in exchange for the 'Tasmanian Naturalist':—

'Records of the Australian Museum,' Sydney.

'Proceedings of the Royal Society of Queensland.'

'Publications from the National Herbarium,' Melbourne.

'Victorian Naturalist.'

'Australian Naturalist.'

'Queensland Naturalist.'

'Geelong Naturalist.'

'Game Laws, and other Publications from the U.S. Department of Agriculture.'

'Proceedings of the U.S. National Museum.'

'Annual Report of the Smithsonian Institution.'

'The Oologist,' Albion, N.Y., U.S.A.

'Entomological News.' Philadelphia.

'Annual Report of New Zealand Department of Agriculture'

Certificates of Membership.

THE Committee decided to issue Certificates of Membership, and no pains have been spared in their preparation. Mr. C. T. Harrisson was entrusted with the work, and, being a keen naturalist and skilful artist, he has worked up a beautiful design. Richea, just bursting into flower, the Tasmanian Tiger (*Thylacinus Cynocephalus*), and Boo-book Owl have been worked into the design. The Certificates will be ready during October and will be forwarded to members as their subscriptions are paid.

J. Walch & Sons, Printers, Hobart.

. . THE . .

Tasmanian Field Naturalists' Club

OFFICE BEARERS, 1910-11

CHAIRMAN - - - MR. A. L. BUTLER

VICE-CHAIRMAN - - - MR. L. RODWAY

HON. TREASURER - - - MR. R. A. BLACK

(Address: 48 High Street, Sandy Bay)

HON. SECRETARY - - MR. E. A. ELLIOTT

(Address: 'Hazelville,' High Street)

HON. ASSISTANT SECRETARY - MR. C. E. LORD

HON. EDITOR 'TASMANIAN NATURALIST'

MR. W. H. CLEMES

Committee:

MR. T. THOMPSON FLYNN, B.Sc.
MR. J. H. GOULD
MR. ROBT. HALL
MR. C. T. HARRISSON
MR. A. M. LEA
MR. A. R. REID

HON. AUDITORS

MESSRS. T. C. SIMPSON, F. L. BROWNELL